HARRISON
HEXAGON

THE
HARRISON MANUFACTURING CO.

(INCORPORATED)

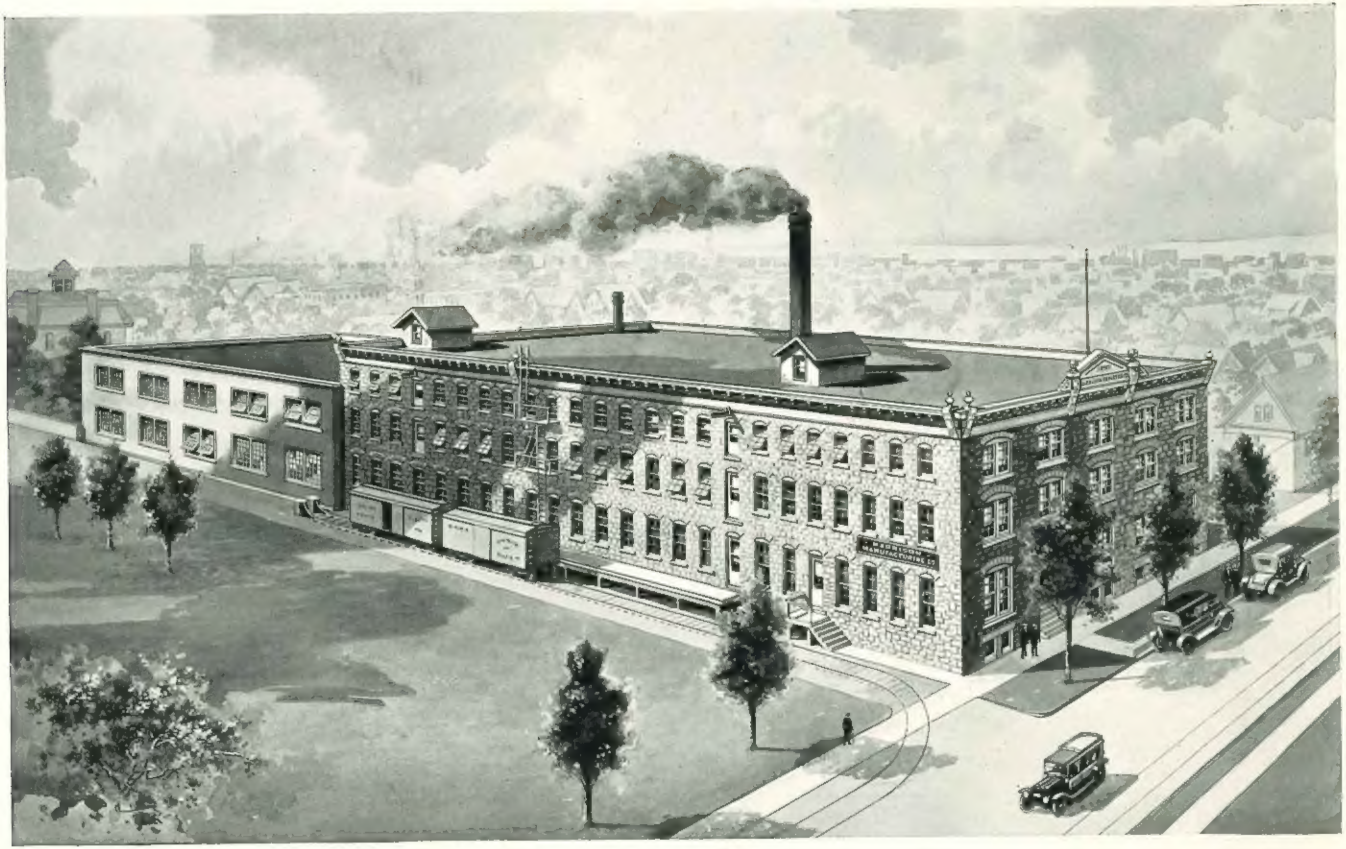
LOCKPORT, NEW YORK

GENERAL SALES REPRESENTATIVES

WETZEL-HALL COMPANY, No. 1832 DIME BANK BUILDING, DETROIT, MICH.

AEOLIAN HALL, No. 33 WEST 42D STREET, NEW YORK, N. Y.

MAIN OFFICE AND WORKS, LOCKPORT, N. Y.


MANUFACTURING CO

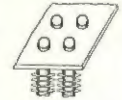
AUTOMOBILE RADIATORS

HISTORICAL

The automobile radiator, or cooler, is used to cool the water which is circulated around the cylinder walls of the engine, and has been developed during the last twenty-five years.

In 1889 Gottlieb Daimler developed a high speed internal combustion engine, and about the same time the pneumatic tire was invented. The evolution of the modern automobile dates from that time, and the progress made in design and construction has been extraordinarily rapid. In the early nineties it is not surprising to find that the steam car over-shadowed the gasoline car, and for some years the progress made in steam propelled motor vehicles was quite remarkable. When, therefore, the development of the gasoline engine made it necessary to provide a small and compact cooler, which could be easily carried upon the car, the first type of radiator developed was naturally of a very similar type to the condensers which had been used upon steam cars.

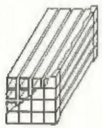
The original type of radiator consisted of plain vertical copper tubes connecting a top and bottom reservoir through which the water, which was circulated around the cylinder, was forced to flow, and, in order to provide greater cooling surface, each tube was surrounded by individual crimped fins, pressed on before the radiator was assembled. This type of radiator has been associated with the Daimler Car, and even to-day has survived in the case of some pleasure vehicles, many of the heavier motor trucks and agricultural tractors.



DAIMLER

The design offers certain advantages, extreme simplicity, and a very free flow of water through

the cooler. On the other hand it soon became apparent that the direct radiating surface exposed to the air was necessarily small, and if sufficient fin tubes were installed, the air passage through the radiator from front to back was unduly restricted. With the necessity apparent of obtaining a far larger proportion of direct radiation (that is, radiating surface on the one side of which is the hot water from the cylinder jackets, and upon the other the cooling air) another type of radiator was developed, which has been generally known since, as the Mercedes, or honeycomb type of radiator.



MERCEDES

This radiator was of radically different construction. Four or five thousand $\frac{1}{4}''$ square copper tubes 4″ long were nested horizontally together, being separated from each other by wires arranged to run between the rows of tubes in both directions. The block so made was clamped together, and dipped in a bath of solder, both front and back, by which means a space $\frac{1}{32}''$ thick was left on each side of every tube. The blocks when made were assembled with top and bottom reservoir, and water was forced to pass in between the copper tubes, the air being allowed to travel through the inside of the tubes. In this arrangement a very large radiating surface was obtained, practically all of which afforded direct radiation, and it is to-day hard to conceive any arrangement offering a larger radiating capacity for any given size of radiator.

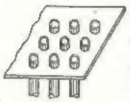
In practice, however, several disadvantages became early apparent.

First—The structure was necessarily costly to build, both as regards labor and material—the seamless tubing used costing 60 cents to $1 per pound.

Second—The radiator, though very effective when constructed, soon deteriorated, owing to clogging of the small water passages, and in many cases caused very serious trouble.

Third—The type proved fragile in use, in spite of its great weight.

A third type of radiator was adopted by the Renault Brothers, which was placed in front of the dash instead of in front of the engine. This was a perfectly plain tubular radiator with a great number of $\frac{1}{4}''$ round soft copper tubes, 10″ long, connecting the top and bottom reservoir. The air was sucked through, both from the front and side, and this formed a very satisfactory arrangement.

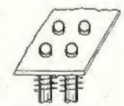


RENAULT

In principle it differed from the Daimler pattern only in the absence of fins and in the greater number of tubes used. This radiator, however, proved expensive to construct, but no substitute for this type placed upon the dash has proved equally satisfactory; and it would appear to be the rational type to adopt, provided the location of the radiator upon the dash for any reason is considered essential.

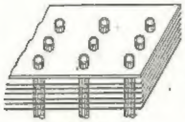
In this country, the larger market for pleasure cars early suggested a simplification of the older types of radiators described, and both the tubular and cellular construction were quickly modified in such a way as to make the production cheaper and reduce the high cost of material used.

The tubular radiator was varied, by using spiral fins which were wound round the tubes and in another way by using a greater number of smaller tubes, which were forced through a system of flat fin plates, each one of which was common to all of the tubes used. Many variations of this construction have been put on the market, but the essential



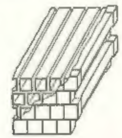
ROME TURNEY

features remain very much the same. These radiators have a comparatively free water circulation and, compared with the Cellular radiator, a comparatively low cooling capacity; in fact, every tubular radiator must to some extent exhibit these characteristics, since, at best, the direct radiation cannot exceed one-third of the total radiating surface exposed, and in many types it does not exceed one-sixth.



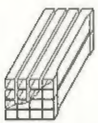
FIN & TUBE

The regular Mercedes Radiator was varied by using in place of $\frac{1}{4}''$ square copper tubes, tubes made of copper sheet, with seams along the side, and having their ends expanded, in order to do away with the wires used for spacing in the regular Mercedes construction. Owing to the fact that the tubes used are larger than in the original design, the cooling capacity of the radiator is necessarily considerably less, but in most essentials the behavior is similar to that of the original Mercedes.



FEDDERS

The construction of the Mercedes or honeycomb radiator was also varied in another ingenious and effective way. In place of using square seamless tubes, flat thin sheet metal of suitable width was crimped every $\frac{1}{2}''$, so as to form a flat plate with double sided plaits at intervals $\frac{1}{2}''$ from end to end. Two of these plates, when placed together with their plaits in staggered relation formed a unit, with the appearance of a number of square tubes stacked together one upon the top of the other, and when two of these units were placed together, side by side, separated by a wire or by an offset on the edges, a radiator section was formed, similar to the Mercedes section, except that the water was allowed only a straight passage through the space formed by the separating wires or offset, there being no cross circulation.



MAYO

This construction has been varied in a number of ways, which does not essentially alter the results, although the method described is probably the best of such arrangements now in use. It is obvious that this radiator will offer 50% direct radiating surface, and 50% indirect radiating surface, providing the plaits are squeezed together tightly, and if the water channels are left sufficiently wide it forms a very satisfactory cooling medium. It has been used on many of the high-grade cars built in this country.

Even with these alterations the same inherent disadvantages are observable in both tubular and cellular type of radiator, for although the air passage in the cellular radiator is extremely free, which promotes efficiency, yet it is difficult to obtain a water passage which is not liable to cause trouble by silting up if dirty or impure water is used.

An adequate water channel is very important in modern construction, owing to the almost universal use of centrifugal pumps to circulate the cooling water, for the capacity of a centrifugal pump, which may be adequate when the car is running at twenty-five miles an hour, will be enormously increased at excessive speeds, and this tends to throw out the water in circulation through the overflow should the water passage not be of ample capacity, or to collapse the rubber connection on the suction side of the pump. The cooling capacity of any radiator is found to slightly increase with the rate of water circulation through the radiator core, but the rate of increase is slow, whereas the cooling capacity of any radiator increases almost in proportion to the amount of air passed through the core. It is, therefore, of very vital importance to obtain the freest possible air passage, and to see that the air pulled through the radiator has an ample exit from under the hood.

The effectiveness of any radiator cannot be judged alone by the quantity of heat dissipated per unit of core surface, since many types of core cannot furnish sufficient surface to dissipate the necessary heat in the small cubic space available for the radiator, and conversely neither can the effectiveness of a radiator be judged alone by the quantity of heat dissipated per unit of core volume, since many types of core, in order to furnish the necessary surface, are made so heavy, as to be commercially impracticable, owing to their high material cost.

Sufficient surface must be provided, no matter what type of core be used, but in the last analysis the efficiency of a radiator can only be judged by one standard, and that is by the actual heat dissipated per unit of time from the cooling water per pound of radiator core, and to obtain the best possible results the metal in the cooling core must be so disposed as to offer a minimum resistance to the air, together with an ample passage through which the water may circulate.

There seems to be a general tendency to equip the car with better grade of cooler than was common a year or two ago, which has been made possible, by increased volume of business and better manufacturing methods. It would seem, too, that the rational procedure is to equip pleasure cars with some form of cellular radiator.

DESCRIPTION OF REPRESENTATIVE TYPES

Radiators may be conveniently divided into three types:

TYPE I .... Tubular   TYPE II .... True Cellular   TYPE III .... Cellular

To Type I, belong the Daimler pattern, the Renault pattern, the Rome-Turney, and all variations of the fin and tube pattern. These are illustrated under Type I. (See insert.)

To Type II, belong the Mercedes and the square tube Fedders. These are illustrated under Type II. (See insert.)

To Type III, belong the Mayo Cellular, the McCord Cellular, the Briscoe Cellular, the Long Cellular, the Livingston Cellular and the Harrison Special Hexagon. All these have a water space on both sides of each row of cells. There is a sub-division of this class, differing radically from the former, where two rows of cells are separated by a single thickness of metal, and there is a water space between every other row of cells. Only two types are exemplified by this construction, namely: the Boblett and the "Harrison Hexagon Cellular," and both these types offer an efficiency per unit of weight unattainable by any other arrangement. They are illustrated under Type III. (See insert.)

In addition to these types there are a great number of constructions, which, as a rule, differ only slightly from some form or other of those described, and which in many cases infringe well-known patented constructions.

DETERMINATION OF THE AMOUNT OF COOLING SURFACE REQUIRED

The question of obtaining a suitable radiator and one adequate to cool the engine, becomes eventually one of choosing a design of core that contains an adequate number of square inches of cooling surface for every cubic inch of piston displacement; or, in other words, for every horse power

developed, when the engine is running at a reasonable maximum out-put of power, or when the car is running at fifty miles per hour. The maximum out-put of power for this purpose may be determined from Tables I and II.

Table No. I will show the motor revolutions when the car is running at fifty miles per hour, taking into consideration the gear ratio and the size of the rear wheels.

Table No. II will show the reasonable maximum horse power developed at the motor speed, calculated from Table No. I, according to the S. A. E. formula, taking into consideration the bore and stroke of the motor for four cylinder motors.

If some standard procedure is not adopted in determining the horse power rating no intelligent provision can be made to cool the motor. The amount of cooling surface required for the maximum horse power so determined, may be read from Table No. III.

Table No. III will show the square feet of surface necessary to provide per horse power with varying thicknesses of core.

FACTORS GOVERNING TYPE OF RADIATOR MOST DESIRABLE TO THE MANUFACTURER

Up to now we have been considering only the amount of cooling surface necessary to provide for a given engine. The different types of core, however, for the same weight, will offer very different amounts of cooling surface, and, further, such surface will be so differently disposed as to effect the efficiency of the radiator. The manufacturer is primarily interested in obtaining that radiator which

will offer a maximum amount of cooling surface most economically disposed for the least weight of metal, and provided neither the strength, durability nor appearance of the core has been sacrificed in obtaining the minimum possible weight, the lightest core will be the best. This is, of course, very obvious, since radiators are made of copper or brass and solder, and the material cost when produced in great quantity is the principal expense of manufacture.

PROCEDURE GOVERNING THE SELECTION OF A RADIATOR

First—Determine the amount of cooling surface necessary to provide for the engine from Tables I, II and III.

A careful examination of Tables IV, V and VI must be made to determine the relative merit of the type of core to be used.

If the space in which the radiator is to be placed is of secondary importance, and the radiator can be made as large as may be necessary, great cooling surface per cubic inch is not essential, but this is rarely the case. Practically, no core which does not offer at least ten square inches of cooling surface per cubic inch should be considered.

Table No. IV shows the cooling surface of various types of core in square inches per cubic inch of core content.

If the cost of the radiator is entirely of secondary consequence, the weight of the core per cubic inch need not be seriously considered. Economy, however, would suggest that no core which weighed more than .024 pounds per cubic inch should be considered.

Table No. V will show the weight in pounds of various types of core per cubic inch of core content.

Of the eligible types which these limitations allow efficiency would suggest that that type of core which shows the greatest cooling capacity in B. T. U. per minute per pound of core should be adopted.

Table No. VI will show the comparative cooling capacity in B. T. U. per minute per pound of core in the various types of radiator cores described, for cores of varying thickness.

Reference to this table will show the most efficient type of core to use, and your choice will be the logical radiator, the "Harrison Hexagon Cellular" Radiator.

DETERMINATION OF SIZE OF "HARRISON HEXAGON CELLULAR RADIATOR"

Having determined the number of square feet of surface necessary to cool the motor, and also having determined the thickness of the core which it is desirable to use, the number of frontal square inches of exposed surface or the frontal area of the core can be read from Table No. VII.

Use for economy the thinnest core with the largest front surface, which it is feasible to accommodate in connection with the hood and the body design. Remember, the thinner the core the more efficient and lighter the radiator. The lighter core is the better and cheaper, which is clearly shown by the curve on Table No. III.

Table No. VII will show the total exposed surface in square feet for various thicknesses of core per frontal area in square inches in the "Harrison Hexagon Cellular Radiator."

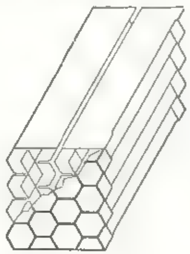
DETERMINATION OF THE WEIGHT OF "HARRISON HEXAGON CELLULAR RADIATOR"

Having determined the frontal area of the core and also the thickness the weight of the core may be read from Table VIII.

Table No. VIII will show the weight in pounds of the various thicknesses of core per frontal area in square inches in the "Harrison Hexagon Cellular Radiator."

THE "HARRISON HEXAGON CELLULAR RADIATOR"

The "Harrison Hexagon Cellular Radiator" consists of hexagon cells, the sides of which are .1823 of an inch long. Between every other row of cells there is a water passage .08 of an inch thick, which insures the free circulation of the water and no liability to clog up from dirt or deposit.



HARRISON

GENERAL CONSIDERATIONS CONCERNING THE DESIGN OF A RADIATOR

In designing a radiator it is of vital importance to the car manufacturer that no feature be incorporated in the design that tends either to weaken the construction or unnecessarily increase the expense of manufacture. With this in view the following general suggestions are offered:

MATERIAL

The core may be made of brass, copper or bronze. Of these three, brass is usually the cheapest, and in the thin sheet stock used usually the most reliable. It is easier to obtain brass free from pin-holes than either copper or bronze, owing to its composition and the methods employed in rolling it.

SHAPE

The rectangular core is the best. Any departure from this shape, by cutting the corners off, mutilates the core during the making, increases the cost of manufacture and weakens the structure.

SHELL

Whereas formerly most high-grade radiators were made with a sheet brass shell, which itself formed the water tanks, to-day the advances made in steel stampings, where the quantity to be made is sufficient, make the employment of a separate steel shell, made in one-piece by a drawing operation, very much preferable. Such a construction eliminates the uncertainty and expense of much

high-priced hand work, enabling great quantities to be produced, all exactly alike. This construction also allows the shell to be enameled with a finish comparable to the rest of the car.

CONTOUR

In striving for graceful stream lines too much taper on the sides of the shell should be avoided, since this increases the difficulty of manufacture and the cost of the dies necessary to produce the shell.

DETACHABILITY

It is frequently desirable to make the shell detachable from the core. There are several reasons for doing this: The core can be assembled with the car, tested if necessary, and the shell, which has previously been enameled, can be attached last, minimizing the chances of scratches and blemishes. But the more important point still, is the fact that this construction saves the car manufacturer money, enabling him to enamel the shells at the same time that he enamels the fenders, and to bake them at a temperature that insures a hard, durable finish.

If the shell is made not detachable, the baking must be conducted at a temperature below that at which solder melts, and special enamels must be employed, which do not give entire satisfaction.

SUSPENSION

Suspension may be either by side bracket or studs, but in the case of side brackets these must be attached to the core and not to the shell, since if attached to the shell, nearly all of the advantages of detachability will be eliminated. The radiator core and shell will have to be assembled at the

same time, and the light gauge steel shell will have to carry the weight of the core through the small attaching lugs bolted to the hood ledge.

The core should be sufficiently strong to carry the shell and the hood, whereas, only with difficulty, can the shell be made sufficiently strong to carry the core.

Upon the following pages will be found some illustrations, showing the present tend of design by users of "Harrison Hexagon Cellular Radiators."

HUDSON

THERE ARE NEARLY TWENTY THOUSAND SATISFIED OWNERS OF THE HUDSON "SIX-40" CARS EQUIPPED WITH HARRISON HEXAGON CELLULAR RADIATORS.

The Harrison Manufacturing Co., Inc.

Lockport, N. Y.

OLDSMOBILE

THE QUALITY CAR DEMANDS A QUALITY RADIATOR.

The Harrison Manufacturing Co., Inc.

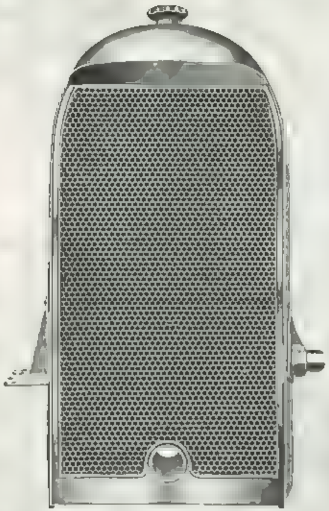
Lockport, N. Y.

HUPMOBILE

THE RIGHT CHOICE FOR DURABILITY AND SERVICE.

The Harrison Manufacturing Co., Inc.

Lockport, N. Y.



EXTRACT FROM LETTER RECEIVED FROM
F. S. DUESENBERG

WE are very much pleased to advise that we have had great satisfaction with these radiators and during the season we have entered sixty-four races, won thirty-nine firsts, twenty-six seconds, eleven thirds and three times finished fourth. During this time our cars have gone through the fence twice, rolled over sideways twice, turned a back somersault once and a forward somersault once. Besides this have had a number of accidents where they have gone into ditches and did not turn over.

The last back somersault was the only accident that caused a leaky radiator and this time the shock came on the radiator direct and damaged it somewhat. Otherwise we have never as much as had a leak in any one of them, although we have replaced five front axles and six rears. We certainly consider that your radiator will stand for more abuse than anything we have ever used in this class of work. A year ago we used a very high-class radiator and were troubled with leaks after nearly every race.

The Harrison Manufacturing Co., Inc.

Lockport, N. Y.

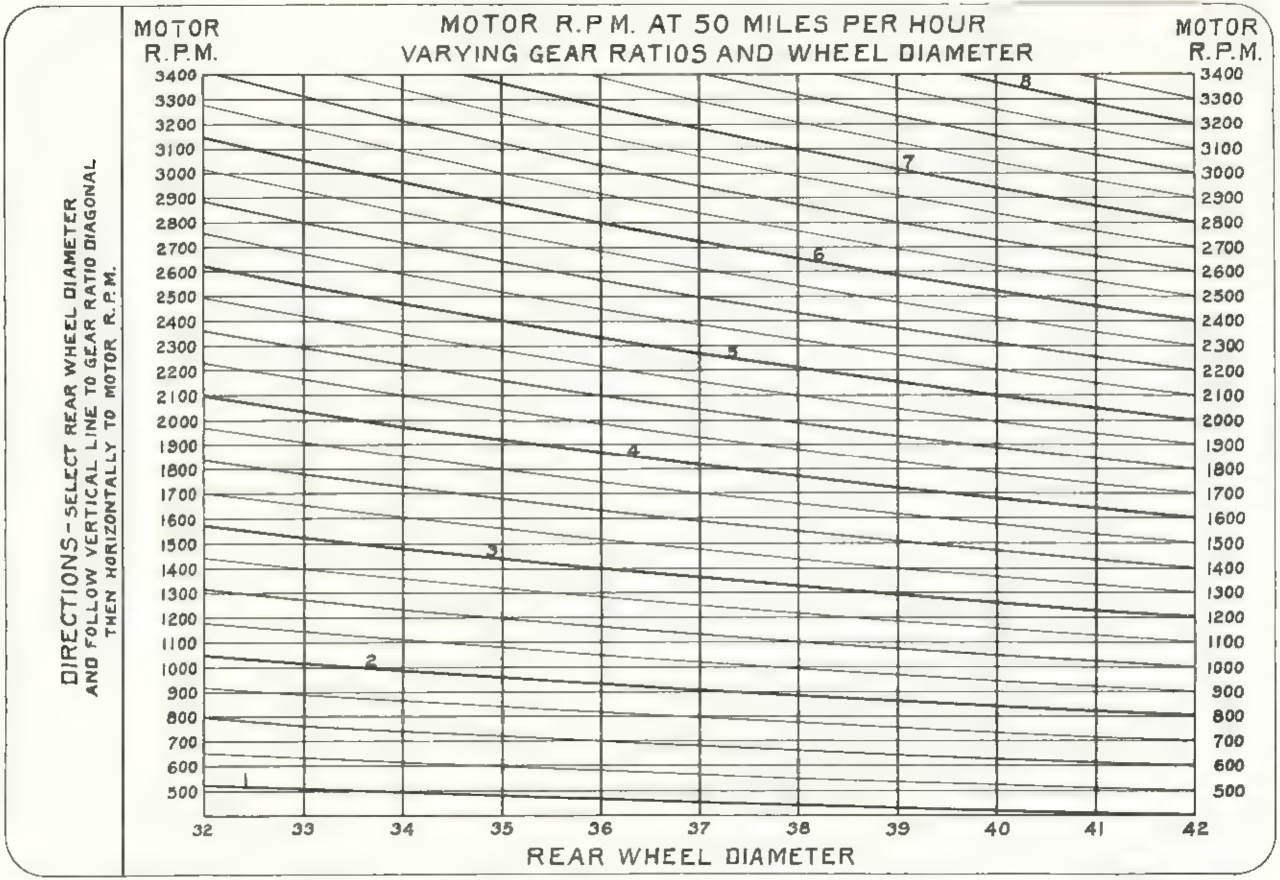
KING

THE PROGRESSIVE MANUFACTURER CHOOSES THE HARRISON HEXAGON CELLULAR.

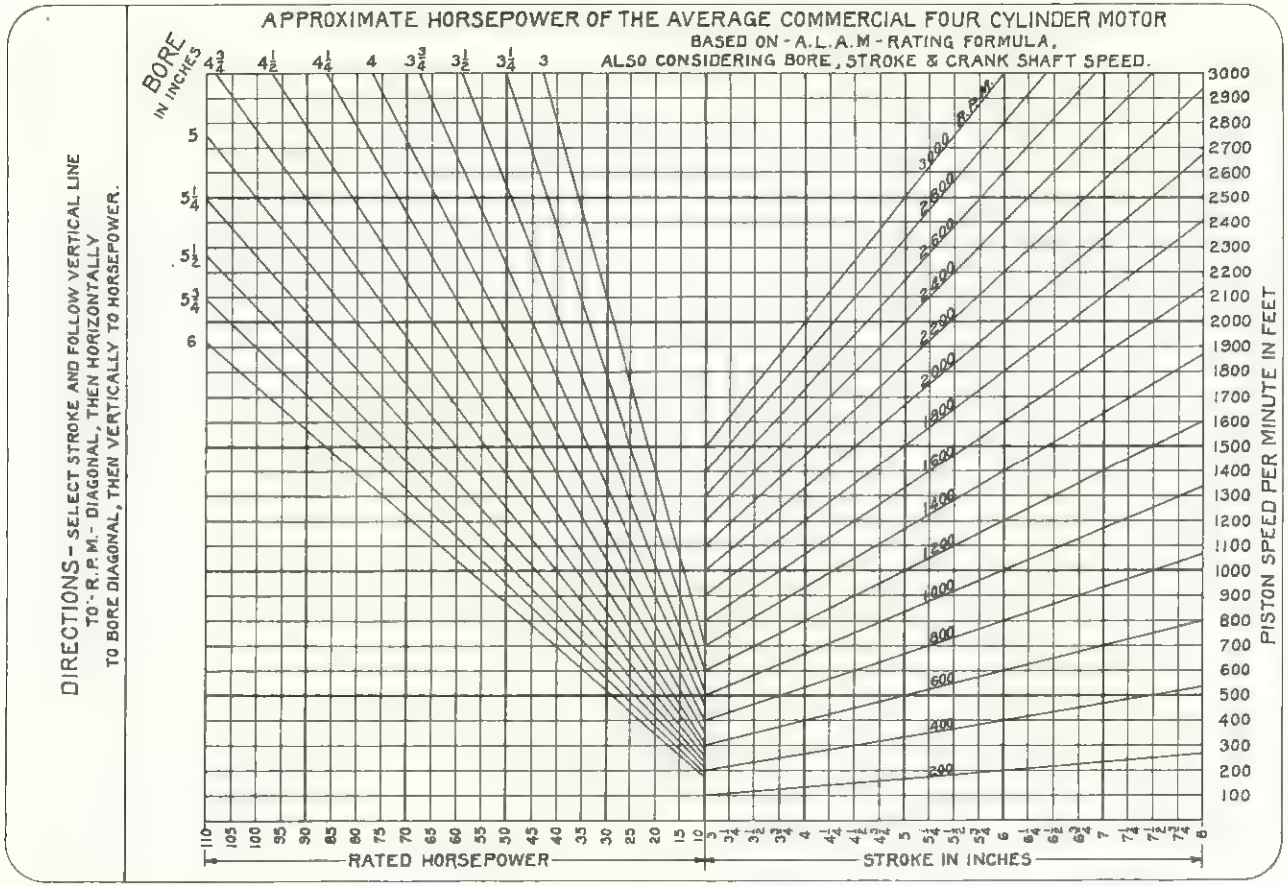
The Harrison Manufacturing Co., Inc.

Lockport, N. Y.

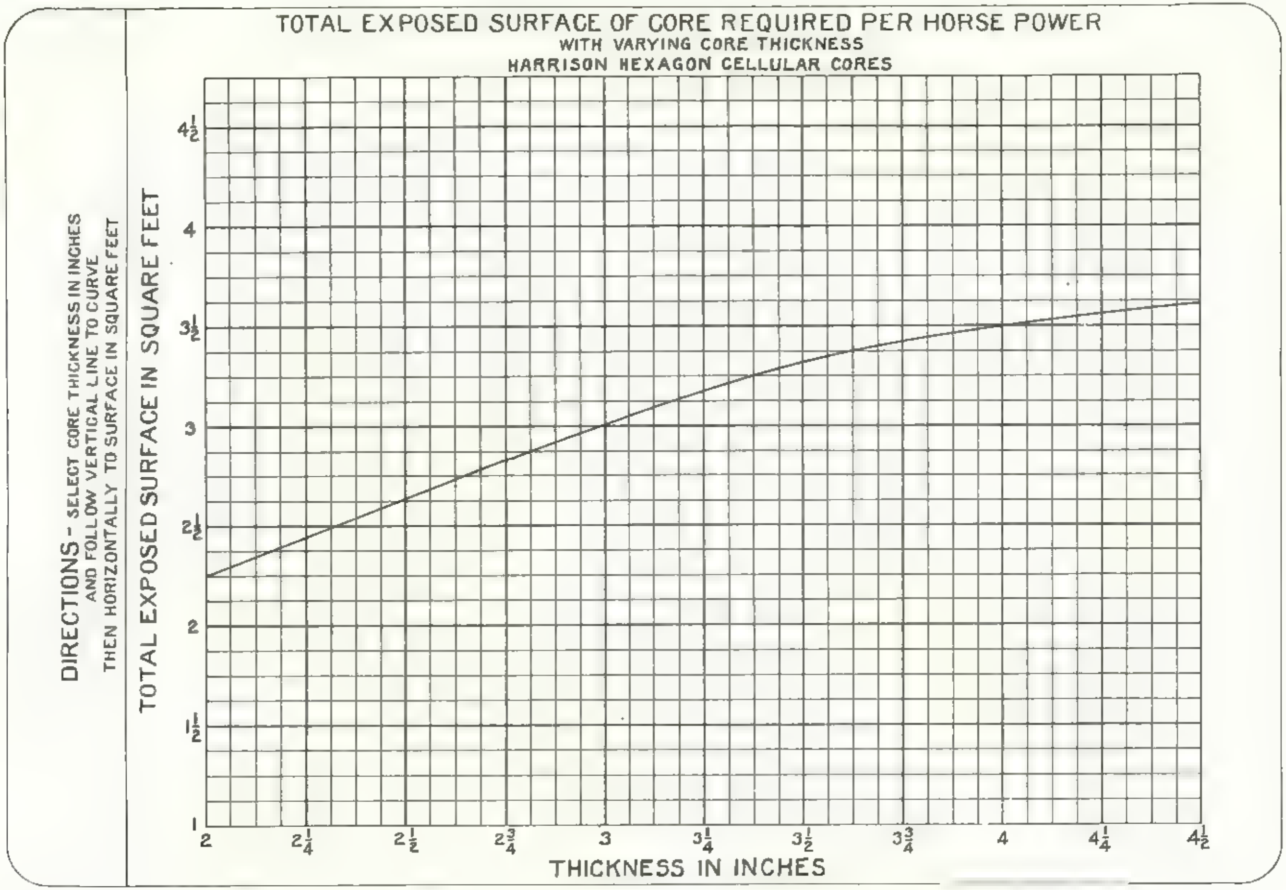
TABLE No. I

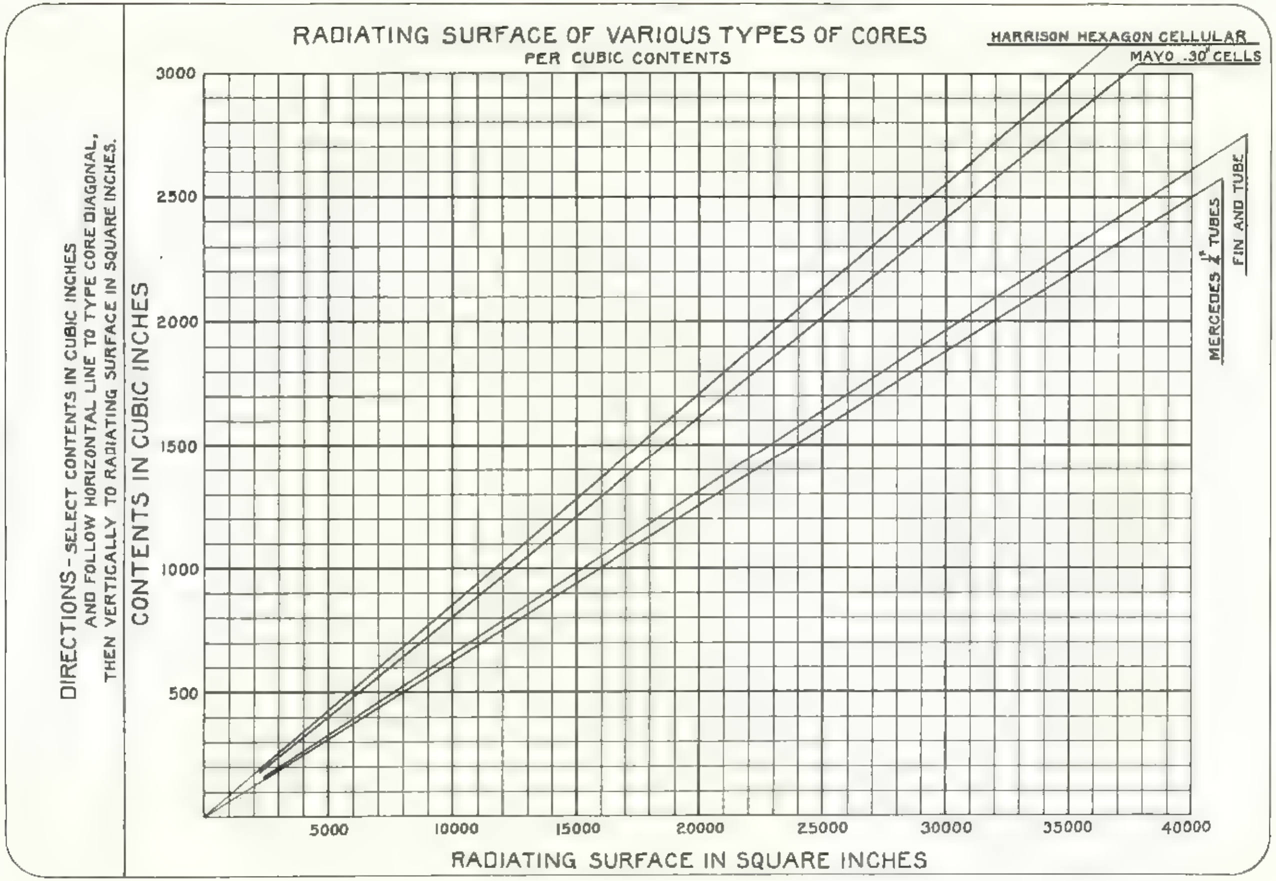


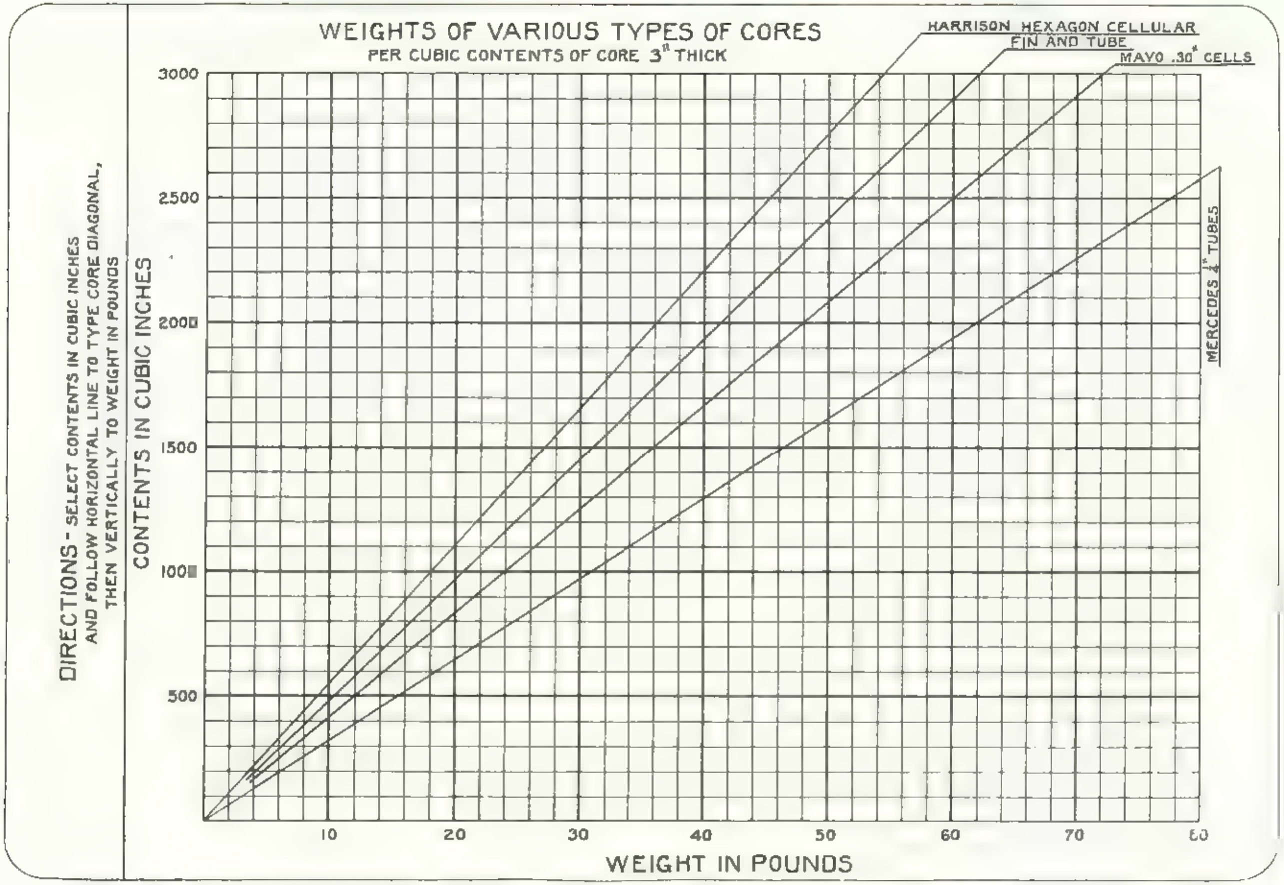
MOTOR R.P.M. AT 50 MILES PER HOUR
VARYING GEAR RATIOS AND WHEEL DIAMETER
MOTOR R.P.M.
MOTOR R.P.M.
DIRECTIONS - SELECT REAR WHEEL DIAMETER AND FOLLOW VERTICAL LINE TO GEAR RATIO DIAGONAL THEN HORIZONTALLY TO MOTOR R.P.M.
3400 3300 3200 3100 3000 2900 2800 2700 2600 2500 2400 2300 2200 2100 2000 1900 1800 1700 1600 1500 1400 1300 1200 1100 1000 900 800 700 600 500
1 2 3 4 5 6 7 8
32 33 34 35 36 37 38 39 40 41 42
REAR WHEEL DIAMETER



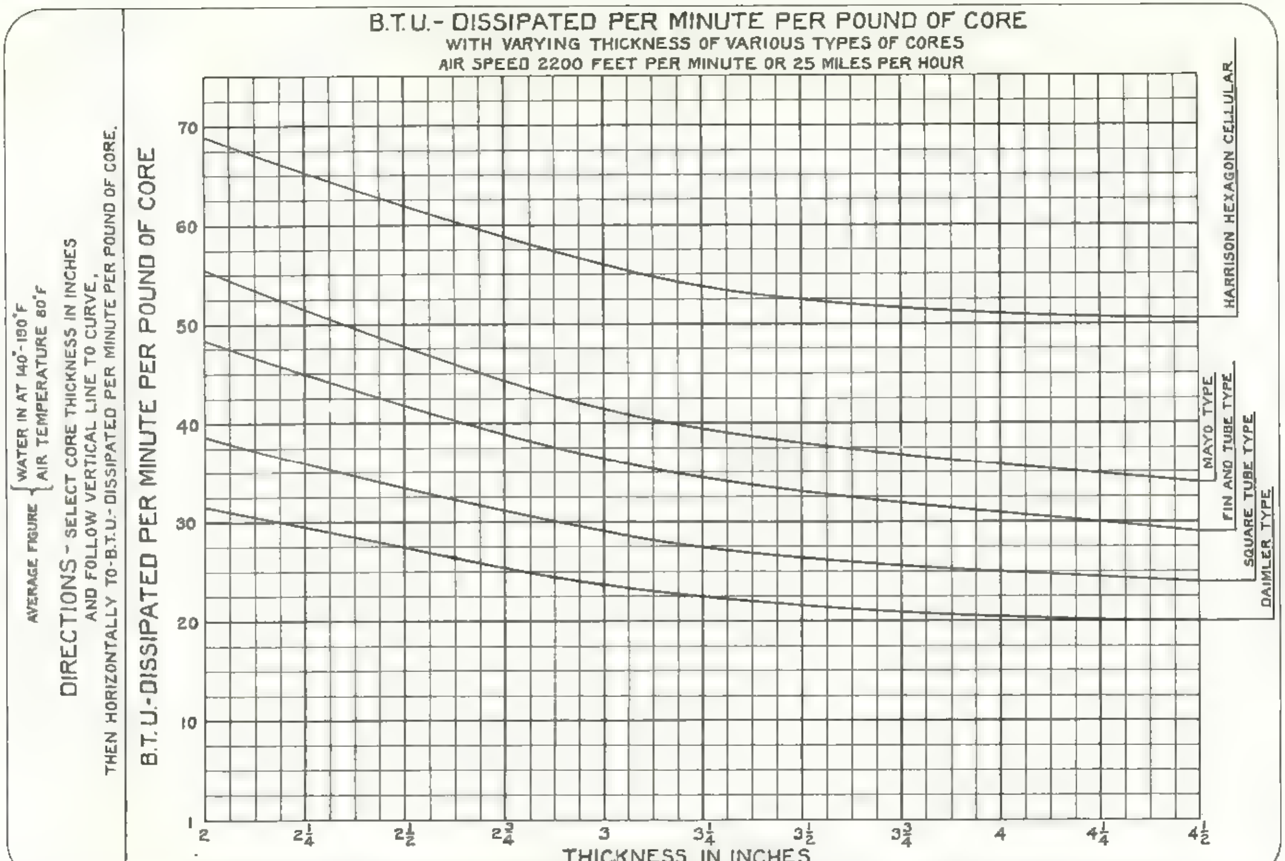
APPROXIMATE HORSEPOWER OF THE AVERAGE COMMERCIAL FOUR CYLINDER MOTOR
BASED ON - A.L.A.M - RATING FORMULA,
ALSO CONSIDERING BORE, STROKE & CRANK SHAFT SPEED.
DIRECTIONS - SELECT STROKE AND FOLLOW VERTICAL LINE TO R.P.M. - DIAGONAL, THEN HORIZONTALLY TO BORE DIAGONAL, THEN VERTICALLY TO HORSEPOWER.
BORE IN INCHES
4¾ 4½ 4¼ 4 3¾ 3½ 3¼ 3
5 5¼ 5½ 5¾ 6
3000 R.P.M.
2800 2600 2400 2200 2000 1800 1600 1400 1200 1000 800 600 400 200
3000 2900 2800 2700 2600 2500 2400 2300 2200 2100 2000 1900 1800 1700 1600 1500 1400 1300 1200 1100 1000 900 800 700 600 500 400 300 200 100
PISTON SPEED PER MINUTE IN FEET
110 105 100 95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10
RATED HORSEPOWER
3 3¼ 3½ 3¾ 4 4¼ 4½ 4¾ 5 5¼ 5½ 5¾ 6 6¼ 6½ 6¾ 7 7¼ 7½ 7¾ 8
STROKE IN INCHES


TOTAL EXPOSED SURFACE OF CORE REQUIRED PER HORSE POWER
WITH VARYING CORE THICKNESS
HARRISON HEXAGON CELLULAR CORES
DIRECTIONS - SELECT CORE THICKNESS IN INCHES
AND FOLLOW VERTICAL LINE TO CURVE
THEN HORIZONTALLY TO SURFACE IN SQUARE FEET
TOTAL EXPOSED SURFACE IN SQUARE FEET
THICKNESS IN INCHES
1
1½
2
2½
3
3½
4
4½
2
2¼
2½
2¾
3
3¼
3½
3¾
4
4¼
4½


RADIATING SURFACE OF VARIOUS TYPES OF CORES
PER CUBIC CONTENTS
HARRISON HEXAGON CELLULAR
MAYO .30" CELLS
MERCEDES 1/4" TUBES
FIN AND TUBE
DIRECTIONS - SELECT CONTENTS IN CUBIC INCHES AND FOLLOW HORIZONTAL LINE TO TYPE CORE DIAGONAL, THEN VERTICALLY TO RADIATING SURFACE IN SQUARE INCHES.
CONTENTS IN CUBIC INCHES
3000
2500
2000
1500
1000
500
5000
10000
15000
20000
25000
30000
35000
40000
RADIATING SURFACE IN SQUARE INCHES



WEIGHTS OF VARIOUS TYPES OF CORES
PER CUBIC CONTENTS OF CORE 3" THICK
HARRISON HEXAGON CELLULAR
FIN AND TUBE
MAYO .30" CELLS
MERCEDES ¼" TUBES
DIRECTIONS - SELECT CONTENTS IN CUBIC INCHES AND FOLLOW HORIZONTAL LINE TO TYPE CORE DIAGONAL, THEN VERTICALLY TO WEIGHT IN POUNDS
CONTENTS IN CUBIC INCHES
3000
2500
2000
1500
1000
500
10
20
30
40
50
60
70
80
WEIGHT IN POUNDS



THE VARIOUS TYPES DESCRIBED HAVE CAPACITIES AS INDICATED, BETWEEN THE LIMITS OF THE MAYO AND DAIMLER TYPES.

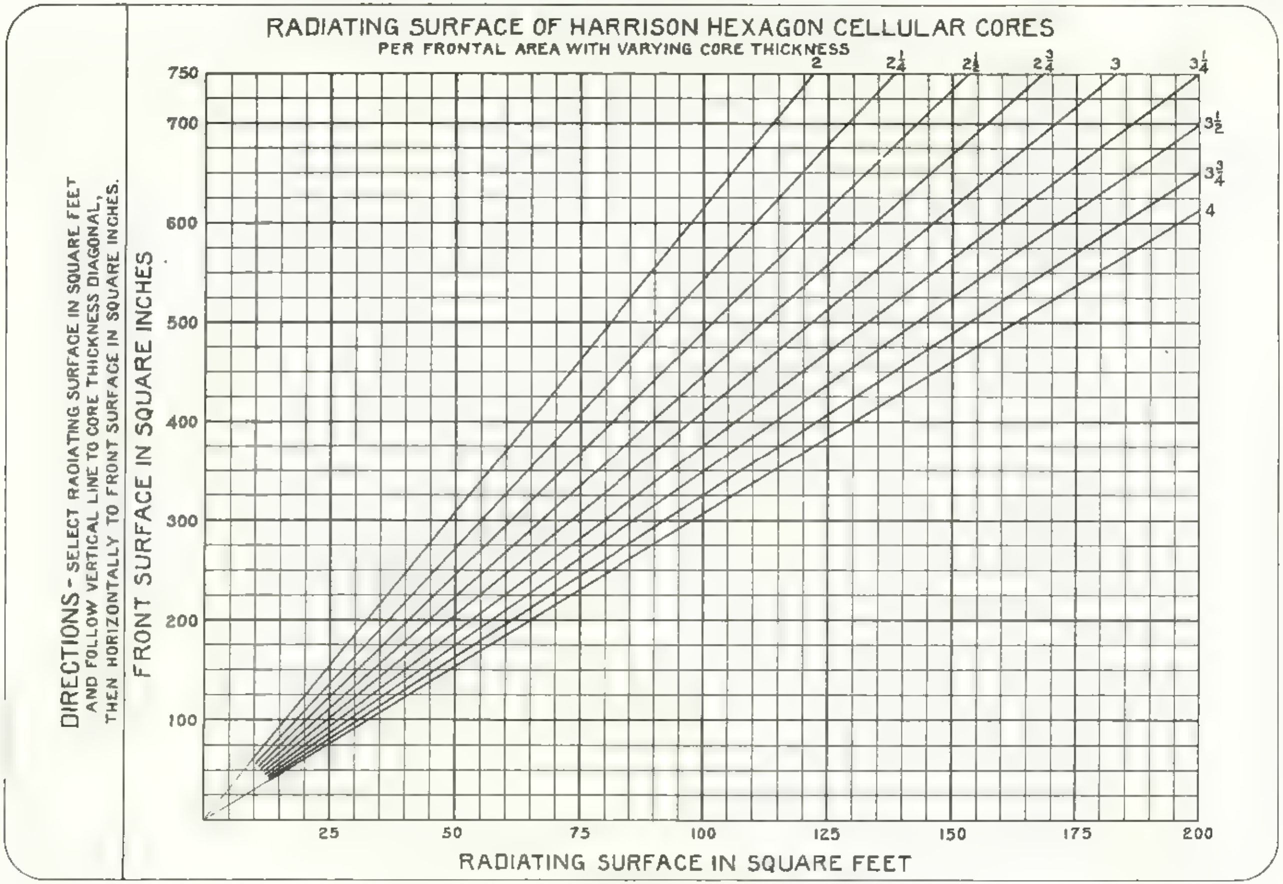
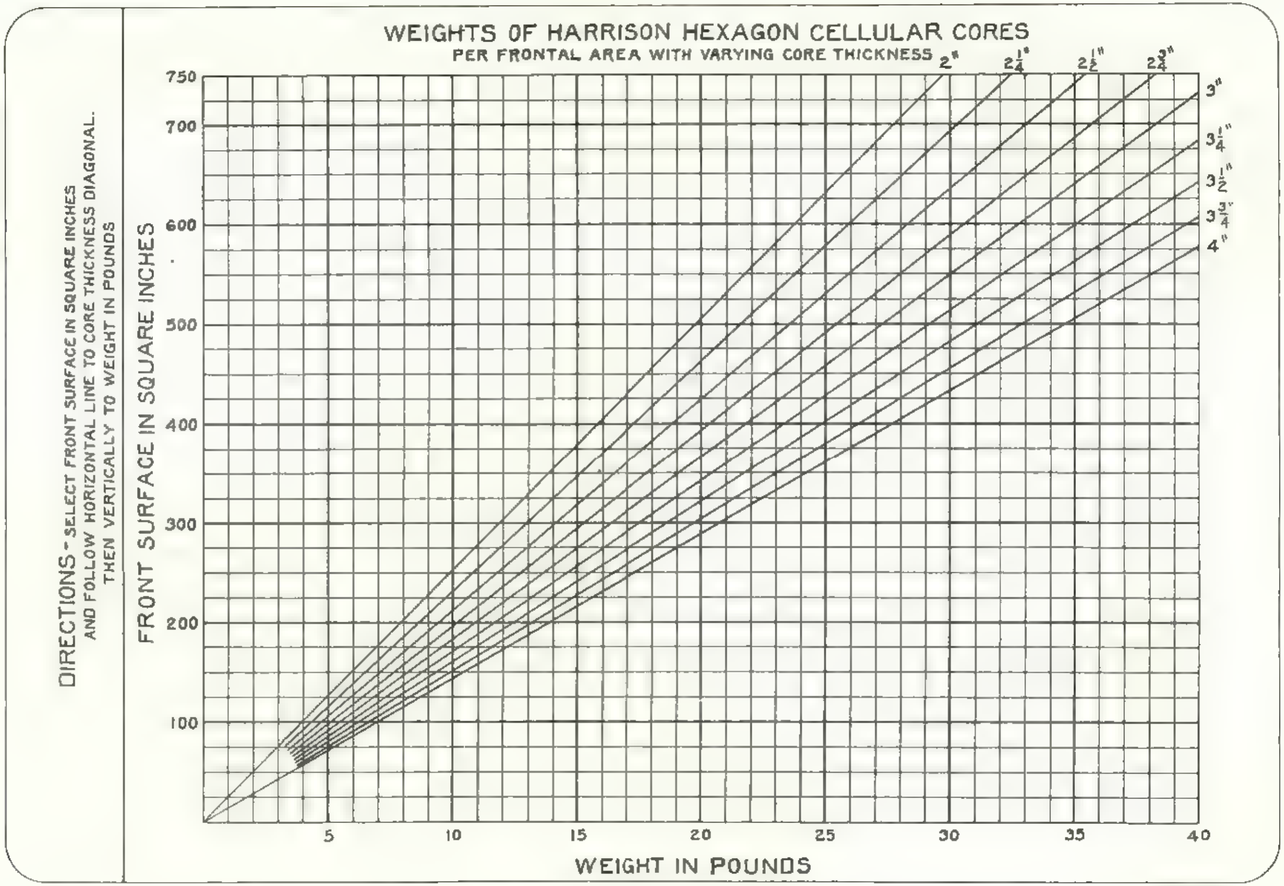

RADIATING SURFACE OF HARRISON HEXAGON CELLULAR CORES
PER FRONTAL AREA WITH VARYING CORE THICKNESS
DIRECTIONS - SELECT RADIATING SURFACE IN SQUARE FEET AND FOLLOW VERTICAL LINE TO CORE THICKNESS DIAGONAL, THEN HORIZONTALLY TO FRONT SURFACE IN SQUARE INCHES.
FRONT SURFACE IN SQUARE INCHES
RADIATING SURFACE IN SQUARE FEET
750
700
600
500
400
300
200
100
25
50
75
100
125
150
175
200
2
2¼
2½
2¾
3
3¼
3½
3¾
4

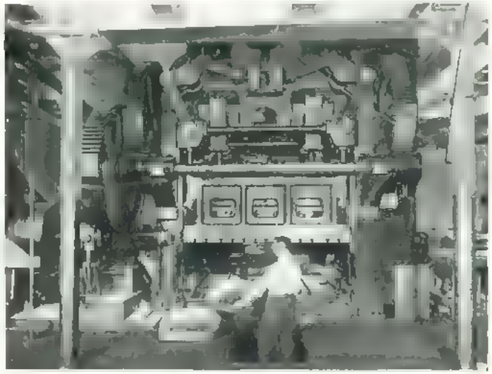
Table No. VIII



THE HARRISON MANUFACTURING CO.

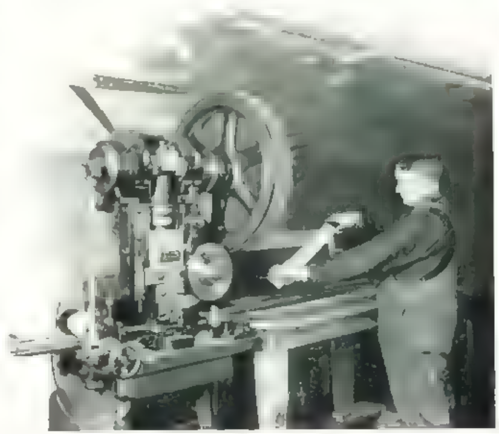
The Harrison Manufacturing Company, one of the last Companies to enter the radiator field, early appreciated that it was not sufficient to make a radiator as good as those in use, but that it was necessary to make one which would be both better, and which could be sold for less money. This necessitated making a core having the metal so disposed as to offer a maximum cooling surface for a minimum weight, and one which could be manufactured accurately with speed and certainty.

The first problem was solved by the use of a water space every other cell, using a single thickness of metal to separate the fins and complete the cellular structure, and the second problem was solved by so constructing the intermediate fin and side walls that they are automatically self-aligning. Both these points are covered by a number of patents, and in the interest of our customers we shall use every means to protect this construction from infringement.



That we have been successful in our aims is proved by our phenomenal growth, and the high standing and number of our customers. It is our policy to use only the best materials, to manufacture radiators as good as can be made, and to sell them at the lowest

possible price. To do this we have had to equip our factory with every modern facility for accurate die making to enable us to use stampings wherever possible, and to install automatic machinery to reduce all hand labor to a minimum. Our equipment includes the largest toggle press possessed by any radiator maker, in which two radiator shells may be stamped simultaneously out of a steel sheet in one operation, and which could, if necessary, produce between 3,000 and 4,000 such shells in a ten hour day.



The construction of our core is the lightest per cubic inch, and the efficiency, namely, cooling capacity per unit of weight is unapproached. Every part of the core is the product of automatic machinery, and when made is self-aligning in assembly.

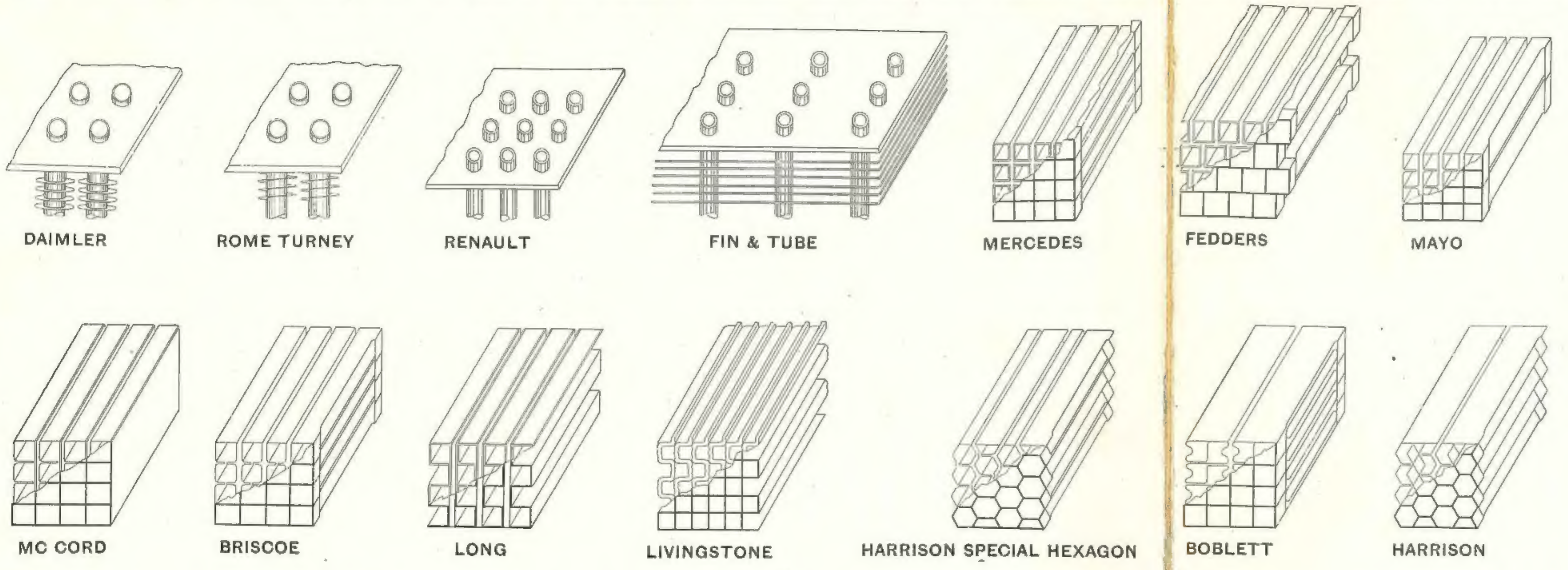
A further peculiarity of our core construction is that the core, although extremely strong can be so much deformed by strain without damage that leakage from a frozen core is practically unknown.

The car manufacturer can no longer afford to use the obsolete square tube or square cell type, either from a point of view of appearance or efficiency. From a sales point of view, too, the square cell no longer stands first, the progressive manufacturer prefers the "Harrison Hexagon Cellular."

No Company making radiators has shown so rapid a growth of business, and no customer, in spite of this rapid growth, has failed to obtain delivery or satisfaction. To gain and retain the confidence of our customers is our aim, and to give the best possible service is our policy.

QUALITY AND EFFICIENCY AT A QUANTITY PRICE

THE MATTHEWS-NORTHRUP WORKS, BUFFALO, CLEVELAND AND NEW YORK


DAIMLER
ROME TURNEY
RENAULT
FIN & TUBE
MERCEDES
FEDDERS
MAYO
MC CORD
BRISCOE
LONG
LIVINGSTONE
HARRISON SPECIAL HEXAGON
BOBLETT
HARRISON